PATENT COOPERATION TREATY

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INTERNATIONAL SEARCHING AUTHORITY

To:

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PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing *(day/month/year)* see form PCT/ISA/210 (second sheet)	
Applicant's or agent's file reference see form PCT/ISA/220	**FOR FURTHER ACTION** See paragraph 2 below
International application No. PCT/EP2004/003995	International filing date *(day/month/year)* 09.04.2004
Priority date *(day/month/year)* 09.04.2003	
International Patent Classification (IPC) or both national classification and IPC C12N15/82, C12N15/11, A01H5/00	
Applicant BAYER BIOSCIENCE N.V.	

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☒ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☒ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notifed the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

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JC05 Rec'd PCT/PTO 07 OCT 2005

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/EP2004/003995

10/552552

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was field, unless otherwise indicated under this item.

   ☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).

2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

   a. type of material:

   ☒ a sequence listing

   ☐ table(s) related to the sequence listing

   b. format of material:

   ☐ in written format

   ☒ in computer readable form

   c. time of filing/furnishing:

   ☒ contained in the international application as filed.

   ☐ filed together with the international application in computer readable form.

   ☐ furnished subsequently to this Authority for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

Box No. II Priority

1. ☒ The following document has not been furnished:

   ☒ copy of the earlier application whose priority has been claimed (Rule 43*bis*.1 and 66.7(a)).

   ☐ translation of the earlier application whose priority has been claimed (Rule 43*bis*.1 and 66.7(b)).

   Consequently it has not been possible to consider the validity of the priority claim. This opinion has nevertheless been established on the assumption that the relevant date is the claimed priority date.

2. ☐ This opinion has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid (Rules 43*bis*.1 and 64.1). Thus for the purposes of this opinion, the international filing date indicated above is considered to be the relevant date.

3. Additional observations, if necessary:

Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-16
	No:	Claims	17-19
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-19
Industrial applicability (IA)	Yes:	Claims	1-19
	No:	Claims	

2. Citations and explanations

see separate sheet

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

Re Item V.

1. The following document are referred to in this communication:
   - D1: PANDA SATCHIDANANDA ET AL: "tej defines a role for poly(ADP-ribosyl)ation in establishing period length of the Arabidopsis circadian oscillator" DEVELOPMENTAL CELL, vol. 3, no. 1, July 2002 (2002-07), pages 51-61, XP009035930 ISSN: 1534-5807
   - D2: US 2002/040490 A1 (ALLEN KEITH ET AL) 4 April 2002 (2002-04-04)
   - D3: WO 03/000898 A (SYNGENTA PARTICIPATIONS AG ; GOFF STEPHEN ARTHUR (US); CHEN WENQIONG () 3 January 2003 (2003-01-03)
   - D4: WO 03/008540 A (SYNGENTA PARTICIPATIONS AG ; KATAGIRI FUMIYAKI (US); COOPER BRET (US);) 30 January 2003 (2003-01-30)

2. Novelty:

The present application refers to transgenic plants having an increased tolerance to stress such as drought, high light intensities and so on. Said plants are generated by altering parG gene coding for (poly (ADP-ribose) glycohydrolase). One way is to use ParG inhibitory RNA (co-suppression, antisense RNAi), the second manner is to mutageneise the ParG gene.

In D1 poly(ADP-ribose) glycohydrolase (PARG) has been identified by map-based cloning of TEJ mutation. Said mutation acts independently of light quality and quantity and affects clock controlled transcription of genes in Arabidopsis.
The TEJ genes code for a PARG (D1, page 52, left column, pargr. 2 and 3 and page 58, left column, paragraph 3).
Therefore the mutants and their method of production of D1 fall under the definition of Claims 17-19 and are not allowable under Art. 33(2) PCT.

3. Inventive step:

The closest prior art document is represented by D1. As pointed out above said document describes a TEJ mutant coding for PARG. TEJ defines a key role of poly ADP-ribosylation in setting a pace of the Arabidopsis circadian oscillator (TEJ mutation acts independently of light quantity and quality). Therefore the structure and the role in stress tolerance of PARG in plants is known from D1.

In difference to D1 the present Claims 1-16 disclose methods to produce plant tolerant to stress conditions via ParG inhibitory RNA molecules whereas in D1 mutants of PARG are produced.
The problem is thus the production of stress tolerant plants. The solution i.e. the inhibition of ParG by inhibitory RNA is obviously derivable from the D2 or D3.
In D2 the tolerance to environmental stress in plants is increased by antisense technology (page 1, right column, paragraph [0010]) . As an example PARG is also selected (SEQ ID. NO. 424).
D1 in combination with D3 also attacks inventive step of claims 1-16. In D3 PARG of plants (SEQ ID .: 550 being 100% identical with SEQ ID. NO: 15 and 99,9 % identical with SEQ ID. No.: 3) is inhibited by antisense inhibition, co-suppression, dsRNAi (page 34, lines 23-29).
D1 in combination with D4 again attacks inventive step. In D4 the production of stress tolerant plants by inhibitory RNA is described (p. 95).

Thus the present Claims 1-16 do not involve an inventive step.

Re Item VIII

In the description of the present application it is not demonstrated that the problem has indeed been solved i.e. that stress tolerant plants have indeed been made by inhibitory RNA or mutagenesis (Art. 5 PCT).

Re Item VIII

Independent Claims 1 and 9 are defined by generic terms which are not defined by true essential technical features such as ParG inhibitory RNA molecule (Art. 6 PCT).